TEST Tomorrow, 11/3

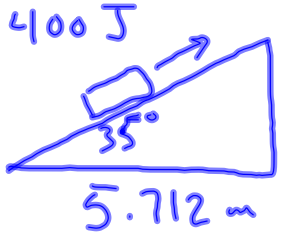
Variable	Unit
W	J
E	J
d	m
F	N
P	W (atts)
V	m/s
a_g	m/s^2
t	s
θ	degrees
m	kg
h	m
U_g	J
K	J
M	none
Eff	%
IMA	none
AMA	none

Review Notes and Practice Problems 4th Block 11.2.11

A log is pulled up an incline that is at 35 degrees above the horizontal. It takes 400 J of work to accomplish this task. The base of the incline has a length of 5.712 m. What is the mass of the log?

$m = ?$

$W = 400\ J$



$h_f = 4\ m$

$h_i = 0\ m$

$$\tan(35°) = \frac{h}{5.712\ m}$$

$$h = (5.712\ m)\tan(35°)$$

$$= 4\ m$$

$$W = (K_f^{\,0} - K_i^{\,0}) + (U_{gf} - U_{gi}^{\,0})$$

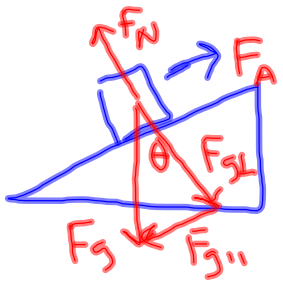
$$W = U_{gf}$$

$$= m a_g h_f$$

$$m = \frac{W}{a_g h_f}$$

$$= \frac{400\ J}{(9.8\ m/s^2)(4\ m)}$$

$$= 10.2\ kg$$

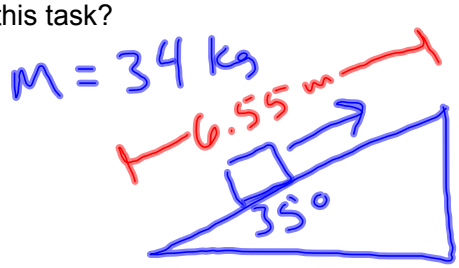


$$W = F_A d \cos\theta$$

Review Notes and Practice Problems 4th Block 11.2.11

A large box with mass of 34.0 kg is slid 6.55 m up a 35 degree frictionless incline with a constant velocity.
a) How much work is done?
b) If it takes 3.00 s to do this work, how powerful is the person sliding the box during this task?

↳ incline distance



$\sin(35°) = \frac{h_f}{6.55\,m}$

$h_f = (6.55\,m)\sin(35°)$
$= 3.76\,m$

a) $W = (K_f - K_i) + (U_{gf} - U_{gi})$

$W = U_{gf}$

$= mgh_f$

$= (34\,kg)(9.8\,m/s^2)(3.76\,m)$

$= 1253\,J$

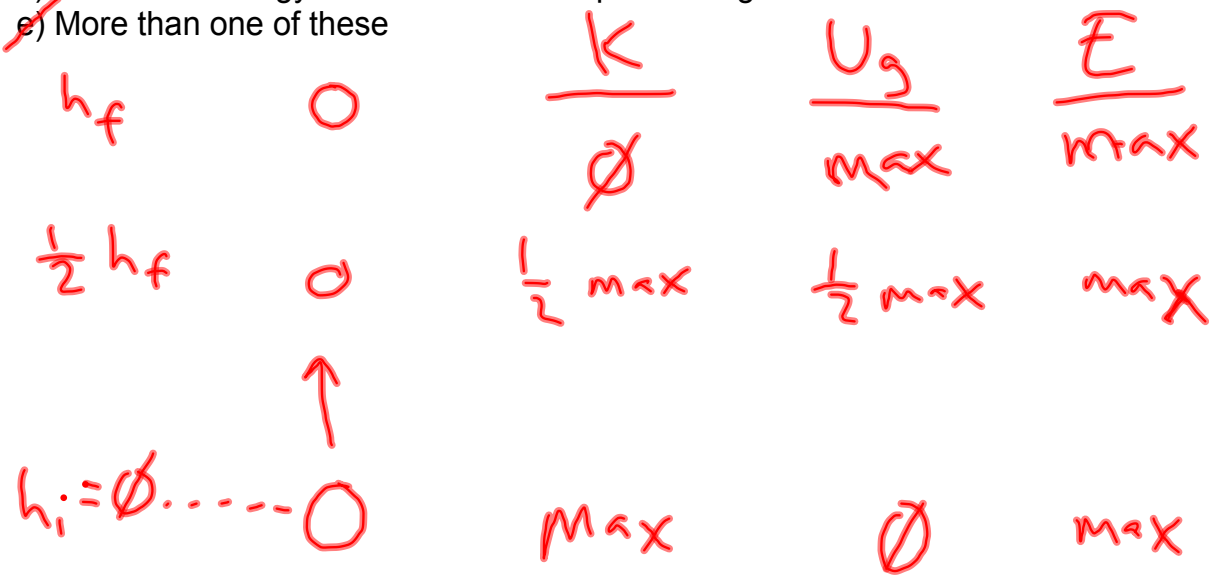
b) $P = \frac{W}{t}$

$= \frac{1253\,J}{3\,s}$

$= 418\,W$

$1\,W = 0.00134\,hp$

If you throw a ball upwards, the kinetic energy it has as it leaves your hand is equal to
a) zero.
b) the work it took to walk the ball horizontally to the spot where you throw it from.
c) the potential energy at the top of the flight (from hand-throw level).
d) the kinetic energy it will have at the top of the flight.
e) More than one of these



At a certain point in an intense footrace, an average sized armadillo and an average sized mouse are moving at the same velocity. Which of the following are true at this point?
a) The mouse is currently in the lead
b) Both of these amazing creatures have the same kinetic energy currently.
c) Both of them have the same amount of momentum.
d) If their velocities hold the same for a few seconds, the armadillo will be more powerful during that time.

$$K_i + U_{g_i} = K_f + U_{g_f}$$

$$\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_f$$

$h_i = 100\ m$

$h_f = 0$

Orion pulls a .555 kg arrow out of his quiver and strings it on his bow. He pulls on the arrow with 40.0 N until the arrow has moved back .750 m. This takes him .950 s to accomplish this task. How powerful is Orion in this situation as he strings his bow?

$m = 0.555\ kg$

$F = 40.0\ N$

$d = .75\ m$

$t = 0.95\ s$

$$P = \frac{W}{t}$$

$$= \frac{F d \cos\theta}{t} \qquad \theta = 0° \quad \cos 0° = 1$$

$$= \frac{(40\ N)(.75\ m)}{.95\ s}$$

$$= 31.6\ W$$

If Orion directs this arrow straight up and lets it go, how high will the arrow go from it's starting point? Use the information from the previous problem.

$h_f = ?$

$v_f = 0\ m/s$

$h_i = 0\ m$

$v_i = 0\ m/s$

$$W = (KE_f - KE_i) + (U_{gf} - U_{gi})$$

$$W = U_{gf}$$

$$F d \cos\theta = m a_g h_f$$

$$h_f = \frac{F d}{m a_g}$$

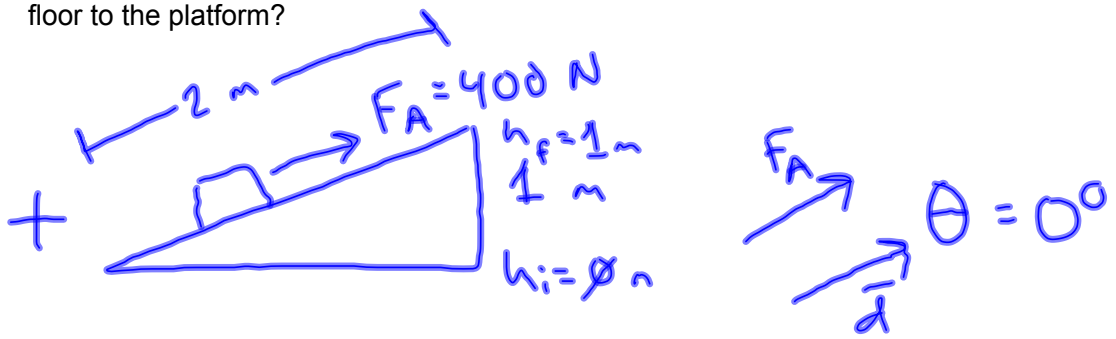
$$= \frac{(40N)(.75\ m)}{(.555\ kg)(9.8\ m/s^2)}$$

$$= 5.52\ m$$

A 60 kg crate is slid up an inclined ramp 2.0 m long onto a platform 1.0 m above floor level. A 400 N force, parallel to the ramp, is needed to slide the crate up the ramp at a constant speed.

a) How much work is done in sliding the crate up the ramp?

b) How much work would be done if the crate were simply lifted straight up from the floor to the platform?



a) $W = F_A d \cos\theta$

$= (400\ \text{N})(2\ \text{m})$

$= 800\ \text{J}$

b) $W = U_{gf} - U_{gi}$

$= mg h_f$

$= (60\ \text{kg})(9.8\ \text{m/s}^2)(1\ \text{m})$

$= 588\ \text{J}$

A pulley system lifts a 1345 N weight a distance of 0.975 m. Paul pulls the rope a distance of 3.90 m, exerting a force of 375 N.
a) What is the IMA of the system?
b) What is the AMA of the system?
c) How efficient is the system?